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## ANSWERS TO CORRESPONDENTS.

Can you inform me what is the use of the comb-like formation on the inside of the middle claw of the Night-heron, the Night-hawk, and Whippoorwill? Is it peculiar to night birds? I find it on those mentioned, and have not noticed it on any bird of the day that I have shot, or is in my collection. — BALDWIN COOLIDGE, *Lawrence*.

We referred these questions to Dr. T. M. Brewer, who thus writes: I have shown your letter to Mr. G. A. Boardman, and have secured a very satisfactory explanation from him of the purpose and use of the "formation" in question. It is used by the birds to clean their heads, and such portions of their neck, back, etc., as they cannot reach with their bills. He often finds them containing feathers, down, dead skin, etc.

H. W., Massachusetts. — The Fern, from Genesee, N. Y., you enclose, is apparently nothing but a poor specimen of *Asplenium thelypteroides* Michaux.

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PROCEEDINGS OF SCIENTIFIC SOCIETIES.

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. — NATURAL HISTORY SECTION. *Burlington, Vt., August 21-26, 1867.* "Considerations relating to the Climate of the Glacial Epoch in North America," by Professor E. Hungerford. The special object of this paper was to discuss the growth and the climatic influence of such an accumulation of snow and ice as the glacial hypothesis supposes to have once existed.

The author called attention to the extremely broken condition of the northern border of the continent, and to the probable effect of a local elevation of that region above its present level, in lowering the snow line by a depression of the summer temperature. A large extension of the area of perennial snow would result from this. But every one hundred feet of snowy accumulation would be more than equivalent in climatic effect to a hundred feet of continental elevation, owing to the peculiar nature of a snowy surface. Every such additional accumulation would depress the summer temperature still farther, and give further extension to the area of perennial snow. This process would go forward until some great reactionary cause is introduced. We should thus have a great snow and ice plateau, covering the northern portions of the continent, without resorting to a very extended upward movement of the continental mass.

The paper then entered upon a discussion of the direct frigorific effects of such an immense plateau, composed of such material, contrasting it with a similar plateau of bare earth, and applying to it various meteorological considerations, all tending to show that in the interior of such a plateau an intensely cold climate would continue through the year.

Application was made of these considerations to the question of a simultaneous motion of a continental glacier in one determined direction. Extreme cold operates adversely to glacial motion, and ground was taken against the probability of such a general simultaneous movement, in such a climate and with no sufficient slope of the country.

The erosive effects which we witness, and which are due to glacial action, are ascribed to a motion always sustained along the southern or seaward margin of the glacier, where a milder climate would prevail. The glacial front itself furnishes the slope, and heavy precipitation above supplies the waste below. Every section of country is twice scoured over,—once during the growth, and once during the retreat of the glacier. By the same motion the detritus is transported over limited distances. For the remote transportation of drift, the agency of icebergs and ice-rafts is necessary. This latter point is discussed in the paper on the Ripton Sea-beaches.

“The Ripton Sea-beaches,” by Professor E. Hungerford. This paper gives a somewhat detailed description of a series of terraces, situated on the west flank of the Green Mountains, in Vermont, on the pass from Ripton to Hancock. They are elevated 2,196 feet above the ocean. Drawings were exhibited in which the distinct terrace forms were displayed, extending up the gorge which forms the pass. Evidence was adduced to show that the materials of the terraces overlies the true boulder drift of the region, and that they thus constitute a modified drift deposit, worked down by waves and currents into their present position and form. The configuration of the country being regarded as unfavorable to the accumulation of a large body of fresh water at this point, these deposits are cited as a strong confirmation of other evidence, that this region has suffered a depression of at least 2,000 feet beneath the sea since the glacial epoch proper.

The author of the paper took occasion to concisely present his views in regard to the causes operating to produce the drift phenomena. The geological events enumerated succeeded each other in the following order:—

1. The formation of a continental glacier to whose partial movements, always limited to a comparatively narrow belt upon the southern or seaward margin, are due the erosive phenomena, and the transportation of the drift over limited areas.

2. A depression of the continent, bringing the ocean into contact with the long glacial border, which, on its retreat, sends off icebergs and icebergs into the ocean. To these are attributed the further transportation of detritus and boulders.

3. Emergence of the continent,—the higher beaches marking the earlier, and the Champlain terraces the later stages of this process.

“On the Geological Relations of the Mastodon and Fossil Elephant of North America,” by Professor James Hall, of Albany. Professor Hall spoke of the geological position in which remains of the mastodon had been found. These remarks chiefly applied to those specimens found in the State of New York, especially describing the location and position in which the skeleton was found at Cohoes last autumn. He was inclined to think that these remains were left in their scattered position by the melting of a glacier. He considered the facts as evidence that the mastodon extended back to the close of the glacial epoch. The paper stimulated so lively a discussion that the time of the session was extended three-fourths of an hour, when a farther discussion was postponed till the next day. During the discussion Professor O. C. Marsh, of Yale College, said that he had seen mastodon bones from Kentucky scratched and furrowed like glacial boulders. Remains of two or three species are found in North America, one of which found in the upper Missouri region lived in the Tertiary period, and hence was much more ancient than that found at Cohoes. It is known that the mastodon lived in Europe and in India previous to the glacial epoch, and he showed that the American facts perfectly coincided with foreign observations. He noticed that remains of an elephant, identical with the one found in Siberia, were numerous in Russian America, and he suggested that the day might come when fossil ivory would become an important article of export from that territory.

“Considerations drawn from the Study of the Orthoptera of North America,” by S. H. Scudder, of Boston. This paper gave a general account of the Orthopteran (grasshoppers, crickets, and the like), fauna of North America compared with that of Europe; showing the greater comparative richness of the American fauna under similar climatic influences. It was followed by a more detailed notice of the groups which are characteristic of one continent in contrast with those forming the essential features in the fauna of the other.

“On recent Geological Discoveries in the Acadian Provinces of British America.” By J. W. Dawson, LL.D., F.R.S., Principal of McGill University. The object of the paper was to notice some recent discoveries, which, though of interest, might have escaped the notice of members of the Association.

In New Brunswick, the older rocks in the vicinity of the city of St. John have been reduced to order, and their probable ages ascertained, principally through the labors of Mr. Matthew, Mr. Hartt, and Professor Bailey. The first step toward the knowledge of their precise date was the discovery of a rich land flora in some of the upper beds, next below the Lower Carboniferous rocks which overlie them unconformably. These fossil plants I was enabled to recognize as of the Devonian Period, and the zealous researches, more especially of Mr. Hartt, have brought to light no less than forty to fifty species, or half of the whole number known in the Devonian of Eastern America, as well as six species of insects, four of which have been described by Mr. Scudder.\* These insects are the first ever found in rocks older than the Carboniferous.

These rocks, consisting chiefly of hard shales and sandstones, having been ascertained to be Devonian, there still remained an immense thickness of underlying rocks of uncertain age. In the upper member of these rocks, the same active observers already mentioned have observed a rich primordial fauna, embracing species of *Conocephalites*, *Paradoxides*, *Microdiscus*, and *Agnostus*, as well as an *Orthis*, and a new type of Cystidians. These fossils are regarded by Mr. Hartt and Mr. Billings as of the age of Barrande's "Etage C," and as marking a new and older period of the "Silurian Primordial" than any other as yet recognized in America, with the exception of the slates holding *Paradoxides* in Massachusetts, and the similar slates of the "Older Slate Formation" of Jukes, in Newfoundland. Descriptions of these fossils, by Mr. Hartt, will be published in the edition of "Acadian Geology" now in press. It is proposed to call this series, represented in New Brunswick by the St. John slates, the *Acadian Series*.

Below these primordial beds are highly metamorphosed rocks, at least 9,000 feet in thickness, which have afforded no fossils. A portion of these beds, consisting principally of conglomerate and trappean beds, is regarded by Messrs. Matthew and Bailey as of the age of the Huronian. The remainder, containing much gneiss and a bed of crystalline limestone, they regard as Laurentian. If this view is correct, and it certainly seems to be probable, these rocks thus rising through the oldest members of the Lower Silurian, and forming a stepping-stone between the Laurentian of Newfoundland and that of New Jersey, show that the foundations of the north-east and south-west line of the east side of North America were already laid in the Laurentian period. Still, it is not here, but farther west, that we are to look for the dividing line between the great inland Silurian basin of America, and that of the Atlantic coast; the latter as has been pointed out by

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\* Canadian Naturalist and Geologist. 1867.

Professor Hall and Sir W. E. Logan, so remarkably distinguished by the predominance of mechanical sediments, and by a development of the lower rather than the upper members of the Lower Silurian.

To ascend from these rocks to the Carboniferous,—recent labors of Mr. Davidson, Mr. Hartt, and the author, had led to the division of the Lower Carboniferous into successive subordinate stages, and to the determination of most of the marine fossils, and also to the explanation of the curious and apparently anomalous fact that some forms allied to Permian species actually exist in the Lower Carboniferous, under the productive coal-measures. These researches had also shown that no distinction between Sub-carboniferous and Carboniferous proper, can fairly be made in Nova Scotia, notwithstanding the grand development of the Carboniferous in thickness.

After noticing the large advances made in the fossil botany of Nova Scotia and New Brunswick, the paper referred to the discovery by Mr. Barnes of two new species of insects, and to the discovery by the writer of a new pulmonate mollusk, described by Dr. P. P. Carpenter, as *Conulus priscus*. There are thus in the coal formation of Nova Scotia a *Pupa* and a *Conulus* or *Zonites*, generically allied to living pulmonates, and representing already in that early period two of the principal types of these creatures.\*

Specimens of these fossils were exhibited, and also specimens and a photograph of the Laurentian fossil *Eozoön Canadense* sent by Sir W. E. Logan. Special attention was drawn to the specimen recently found by the Canadian Survey at Tudor, which shows this organism in a state of preservation comparable with that of ordinary Silurian fossils.

“On the Distribution of Radiata on the West Coast of America.” By Professor A. E. Verrill. In this paper the author has endeavored to present all the facts hitherto published in regard to the geographical distribution of the Radiates along the entire Pacific coast of America, as well as many new observations upon those found in the tropical region.

The present state of our knowledge indicates that the entire coast may be divided into at least eleven regions, or zoölogical provinces, each characterized by a peculiar assemblage of species and genera, some of which are restricted to each province, while others pass the bounds into adjacent provinces, on one or both ends, in diminished numbers. Temperature was shown to be the principal physical agency in limiting the distribution of species, but the nature of the bottom and the character of the shores have their influence. The depth of water probably has a direct influence on certain

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\*Acadian Geology. Second Edition.

species, but its principal influence is *indirect*, by influencing temperature, increase of depth being, in the sea, analogous to increase of elevation upon land, diminishing the temperature and allowing northern animals to extend in deep water farther toward the equator than upon the shore. The number of species of each class of Radiates found in the several provinces was stated, together with those that were peculiar to it, and those that range into other provinces north or south. The Arctic division of the coast north of Sitka, was shown to be characterized chiefly by circumpolar species, found also on the North Atlantic coasts of America and Europe, and, in some cases, upon the North Pacific coast of Asia; several of the common New England Star-fishes, Sea-urchins, and Actiniæ are examples of species having this wide northern distribution. Each of the other provinces was compared with the adjacent ones, and with the parallel provinces of the Eastern American coast and the coast of Europe, most striking resemblances to the latter being common. The Tropical or Panamian province, extending from the head of the Gulf of California and Cape St. Lucas to Cape Blanco, Peru, was compared with the Caribbean province, extending on the Atlantic coast from Florida to Brazil, and including the West Indian Islands. Very few species of Radiates are recorded as identical between the Atlantic and Pacific, and these are all Holothurians, and therefore doubtful. The Polyyps and Corals are remarkably different, not only in species, but often in genera and families. No coral-reefs occur on the Pacific side, but several corals of considerable size occur. The Panamian Acalephs are almost unknown. A small per cent. of Mollusca are admitted as identical on the two coasts, by Dr. Carpenter, and of Crustacea and Fishes by others; but the general correspondence in the genera and families in these groups and in Echinoderms is very remarkable. There is no direct evidence of a water communication across the Isthmus since the Cretaceous period, but shells have been found in the Miocene of San Domingo, and near Aspinwall, allied more nearly to living Panamian shells than to those of the Atlantic. All the evidence is against the supposition that the Gulf Stream has flowed across the Isthmus, since the existence of living species. And there is more evidence of existing Pacific species passing into the Atlantic, than the contrary.

In conclusion, it was thought that a depression of about three hundred feet, causing a connection across the Isthmus by means of a shallow estuary of brackish water, sufficiently pure to sustain the life of many Mollusca, Crustacea, and Fishes, but not the floating germs of Corals and other Radiates, would sufficiently account for the distribution of all the known identical species. But to account for the distinct but similar species belonging often to genera not found in the East In-

dies and Central Pacific, it will be necessary to suppose that they were created separately, as we find them, each adapted to its province; or else that they have descended from common ancestors, becoming gradually different by natural selection or otherwise, and pointing to an earlier, very ancient, and extensive connection between the two oceans.

Prof. O. C. Marsh exhibited some remarkable fossil Sponges from the Lower Silurian of Kentucky, for which he had recently proposed the new genus *Brachiospongia*. The type of the genus was *B. Ræmerana*, and several other species have recently been discovered. These forms are very unlike any known sponges, recent or fossil, and are of great scientific interest. A full description of them will soon be published.

"On certain Effects produced upon Fossils by Weathering." By Professor O. C. Marsh. Certain peculiarities in some fossil shells, which had been a puzzle to the German geologists, were very clearly explained by Professor Marsh as due to the action of the elements, the parts of the shell being differently composed and of different degrees of hardness. This has been most frequently noticed in fossil Cephalopods, which in some instances show lobe-lines, characteristic of two different genera on the same specimen. This is very often the case with *Ceratites nodosus*, from the Trias of Germany.

NOTE.—This number is devoted largely to the proceedings of the American Association for the Advancement of Science. In order to make room for the valuable and interesting address of the President, and the abstracts of papers read in the Natural History Section, we have crowded out articles and illustrations originally intended for this number.

We trust all our readers will feel an interest in the growth and full success of the American Association, whose meetings are doing so much for the diffusion and advancement of Science in this country, and prove such pleasant reunions for all interested in the cause.

The abstracts of the papers will be continued in future numbers.

#### BOOKS RECEIVED.

*Life Beneath the Waters; or the Aquarium in America.* By Arthur M. Edwards. New York; 1858. 12mo. Illustrated.

*On a Fungoid Parasite, or Caterpillar Fungus, from the Philippine Islands.* By Dr. Samuel Kneeland. (From the Proceedings Boston Society Natural History.) 1867. 8vo, pp. 6.

*Notes on Fossils recently obtained from the Laurentian Rocks of Canada, and on objections to the organic nature of Eozoön.* By J. W. Dawson, LL. D.; with Notes by W. B. Carpenter. Plates XI and XII. (From the Proceedings of the Geological Society, London, May 8, 1867.) 8vo, pp. 7.

*Catalogue of the Lepidoptera of New Orleans and its vicinity; prepared by L. Von Reizenstein.* New Orleans, 1863. 16mo, pp. 10.

*Mental and Social Culture; a Text-book for Schools and Academies.* By L. C. Loomis, New York. J. W. Schermerhorn & Co. 1867.